DOCUMENT RESUME

ED 111 299 HE 006 706

AUTHOR Sprague, Charles C.
TITLE Undergraduate Medical Education Elements-Objectives-Costs. Report of the Committee on the Financing of Medical Education.
INSTITUTION Association of American Medical Colleges, Washington, D. C.
SPONS AGENCY National Institutes of Health (DHEW), Bethesda, Md. Bureau of Health Manpower Education.
PUB DATE Oct 73
NOTE 39p.

EDRS PRICE MF-$0.76 HC-$1.95 Plus Postage
DESCRIPTORS *Cost Effectiveness; *Costs; *Educational Finance; *Educational Objectives; Financial Support; *Medical Education; Medical Schools; Tables (Data)

ABSTRACT

In order to consider how medical education is financed guidelines have to be developed that accurately estimate the costs of the resources required for contemporary medical education. It is then necessary to estimate the cost of undergraduate medical education within the perspective of the total education and training of the physician and the other programs and activities of the complex modern medical school. To accomplish this goal, the institutional setting in which this education takes place and the elements and objectives of the undergraduate medical education program are described. The elements and objectives of undergraduate medical education also are defined. Quantitative cost measurements are then presented and the committee's views on the issues surrounding cost measurement are discussed. Suggestions are that future levels of such support be determined by estimates of the costs of the educational program leading to the M.D. degree. (Author/KE)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED111299

ASSOCIATION OF AMERICAN MEDICAL COLLEGES

Library
National Center for Higher Education

UNDERGRADUATE MEDICAL EDUCATION
ELEMENTS – OBJECTIVES – COSTS

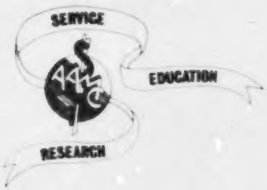
REPORT OF THE COMMITTEE ON THE FINANCING OF MEDICAL EDUCATION

OCTOBER, 1973

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY
Association of American Medical Colleges
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER

The Association of American Medical Colleges gratefully acknowledges the support of the National Fund for Medical Education, Inc. for the activities of the Committee on the Financing of Medical Education. The work upon which this publication is based was supported in part by the Bureau of Health Manpower Education, Department of Health, Education and Welfare, under Contract No. NIH-72-4401. However, any conclusions and/or recommendations expressed herein do not necessarily represent the views of the Bureau of Health Manpower, the National Institutes of Health, or the Department of Health, Education and Welfare.



ASSOCIATION OF AMERICAN MEDICAL COLLEGES

UNDERGRADUATE MEDICAL EDUCATION
ELEMENTS — OBJECTIVES — COSTS

REPORT OF THE COMMITTEE ON THE FINANCING OF MEDICAL EDUCATION

CHARLES C. SPRAGUE, M.D., CHAIRMAN

COPYRIGHT, 1973 - ASSOCIATION OF AMERICAN MEDICAL COLLEGES

FOREWORD

Contemporary medical education takes place in institutions engaged in a broad range of interrelated activities designed to serve and further national purposes and objectives in health. The growing need for information to illuminate the complex programmatic and fiscal circumstances governing medical schools has long been a concern of the Association of American Medical Colleges and of the medical education community. To help meet this need, the Association in 1970 formed the Committee on the Financing of Medical Education to conduct and sponsor studies designed to provide the data base for recommendations on matters of policy relating to medical education and its financing.

Shortly after it was formed, the Committee recognized that before it could turn to a consideration of how medical education should be *financed* it would have to develop guideline estimates of the *costs* of the resources required for contemporary medical education. Attention was focused initially on the cost of the education program leading to the doctor of medicine degree.

The Committee has tried to place the estimation of the cost of undergraduate medical education within the perspective of the total education and training of the physician and the other programs and activities of the complex modern medical school. To accomplish this goal, this report describes the institutional setting in which education takes place and defines the elements and objectives of the undergraduate medical education program. The resources required for this educational process measured in dollar terms are estimated from studies carried out in medical schools. The quantitative cost measurements are then presented, followed by a discussion of the Committee's views on the issues surrounding cost measurement.

The findings of this first study of the cost of undergraduate medical education may be relevant for an assessment of the current Federal policy to provide financial support for undergraduate medical education, based on the number of medical students enrolled. There have been suggestions that future levels of such support be determined by estimates of the costs of the educational program leading to the M.D. degree.

It is the intention of the Committee to present in a subsequent report its views of the mechanism through which the costs of undergraduate medical education should be financed. An equitable distribution of these costs among the immediate beneficiaries of the process and society, and the maintenance of the institutions in which the educational process necessarily takes place must be assured if the benefits which have flowed from the medical school are to continue to play their important role in advancing the health of the nation.

The Committee wishes to express its deep appreciation and gratitude for the assistance of the members of its Task Force groups, the representatives of the medical centers that were studied, and the Association's staff in developing the data on which this report is based.

Charles C. Sprague, M.D.
Chairman
AAMC Committee on the
Financing of Medical Education

TABLE OF CONTENTS

Page

Summary 1

Medical Education in Perspective 3

- The Organizational Setting 3
- The Continuum of Medical Education 4
- Other Educational & Training Programs 7
- Health Services 7
- Biomedical Research 7

Measurement of Costs – Problems and Issues 9

- Data Limitations 9
- Conceptual Issues Surrounding Joint Costs 11

The Study Findings 13

- Cost of Instruction Component 14
- Cost of Research Component 15
- Cost of Clinical Activity Component 17
- Cost of Administrative, Scholarly, and Professional Activities Component 17

Significance of the Cost Measures 19

Technical Notes 21

- A. Derivation of the Empirical Data 21
- B. Research and Clinical Activity Components 25

Committee and Task Force Membership Lists 32

SUMMARY

This first report of the Association's Committee on the Financing of Medical Education presents an analysis of the cost of the resources required for the educational program leading to the doctor of medicine degree; it represents the necessary first phase of the Committee's ongoing consideration of the appropriate sources of funds for medical education. The report is made available prior to the completion of the full study in response to the Association's objective to provide pertinent data on all phases of medical education as quickly as such information becomes available.

The Committee's findings may be summarized as follows:

1. The annual cost per medical student of the educational program leading to the M.D. degree is estimated to range from $16 thousand to $26 thousand in 1972 dollars. The estimates are based on an intensive review of the cost allocation studies completed by a selected group of twelve medical schools, supplemented by information developed by the institutions involved, and by the Committee, specifically for this purpose.
2. The costs of the educational resources required for the M.D. program at the twelve institutions reflect the varied educational objectives, programs, and techniques essential for a flexible approach to the training of students with differing interests and career aspirations. Because medical education is characterized by a considerable degree of variation in form and manner of presentation, the costs for any one center are not to be considered as typical or average. The range of costs are guideline estimates, embracing a spectrum of diversity in the institutional approach to providing undergraduate medical education.
3. Training for the M.D. degree requires elements of instruction, research, and exposure to clinical practices and procedures. These can only be provided by the contemporary medical school, some of whose broader objectives in health - to advance biomedical knowledge through research and to provide for the health needs of the community - are accomplished jointly with the activities essential for the undergraduate medical education program. Assumptions have to be made, therefore, in order to allocate to undergraduate medical education its share of these joint costs.
4. The cost of undergraduate medical education represents only a part of the total cost of preparing a physician. A period of graduate medical education is required for the further development of the knowledge and skills acquired as a medical student to qualify the physician for the independent practice of medicine. There is also a need for continuing education to keep the practicing

physician abreast of the day-to-day developments in medicine.

5. The ability of the medical school to carry out any segment of the total education and training of the physician requires that it receive support for the total costs of the programs essential to this process. This means not only the costs identified with the instructional programs but the entire costs of the joint activities related to the instructional program such as research and professional services. Such joint activities can not be carried out at a level of support identified in cost studies as related to their contributions to undergraduate medical education. The remaining part of any joint activity related to the costs of other programs must also be supported if the activity is to be viable and if it is to make its contribution to undergraduate medical education.

MEDICAL EDUCATION IN PERSPECTIVE

The Organizational Setting

It may have been true some decades ago that the education leading to an M.D. degree took place in a setting almost entirely devoted to that sole objective. But the contemporary medical school, and thus the framework for medical education, has become increasingly complex, in a growth pattern that has seen:

- The total teaching responsibility of the medical school increase from 65,000 students (medical student equivalents) in 1961 to 110,000 in 1972. In the earlier year, undergraduate medical students comprised almost half this student population. By 1972, however, they accounted for two out of five students taught by the medical school faculty. All other students as a group – interns, residents, pre- and postdoctoral students in the basic and clinical sciences and the full-time equivalent students in the other health professions – comprised three-fifths of the student population.
- The medical schools respond to the decisions made by the Congress and the Executive Branch after World War II that biomedical research was in the public interest and that public funds should be appropriated to support broad-ranging investigations in living systems and in the changes brought about by disease, with the conquest of disease the ultimate goal. Through this support, which has grown from less than $10 million in 1950 to more than $400 million by 1972, medical schools, working with the National Institutes of Health, have developed a biomedical research establishment in the medical schools which has no peer in the world. It has not only provided new knowledge on which to base more definitive methods for the prevention, diagnosis, and treatment of disease, but it has also provided the medical school milieu required for the education and training of the modern physician.
- Expenditures by medical schools to support their regular operating programs grow from $200 million in 1961 to $780 million in 1971; and in the same period, expenditures for all sponsored programs increase from $220 million to $930 million, including support for application of fundamental biomedical and clinical research discoveries to improved health care. Medical schools have thus emerged into a multi-billion dollar enterprise.
- University hospitals and their major teaching affiliates together account in 1970 for one-fifth of all the health care provided by the nation's hospitals, increasing from a proportion of less than fourteen percent of all hospital operating expenditures in 1965, almost a fifty percent increase in the importance of these teaching hospitals as a provider of health care.

This general description of academic medical centers as institutions with the same objectives to educate health professionals, to advance biomedical knowledge through research, and to provide health services to the communities in which they are located may be misleading because it is an over-simplification of the situation. Each medical school is a unique institution, with its own arrangements, programs, and means for accomplishing the national objective to bring to the American people the best possible levels of health.

Each medical school has developed its own individual characteristics and mix of programs to make its contribution to improving health for the following reasons:

- The capabilities and educational requirements of medical students and the wide variety of career opportunities in medicine, ranging from primary care through the more specialized branches of medicine to teaching and biomedical research, require diversity among the medical schools and programs to permit the most effective development of the individual's capabilities.
- There are a number of different institutional arrangements for medical schools; some are components of large multiversities, while others are free standing, some are located on the campus of the parent university where there can be a greater sharing of resources and responsibilities for educating other students than where the medical school is geographically separated.
- Responsibilities for the delivery of health care vary with the organizational arrangements regarding the clinical facilities and the location of the medical school; some medical schools are involved in the full management and operation of a hospital while others make use of facilities under the control of others; some are in large urban settings where additional resources and facilities are available to provide health care while others are in smaller more isolated communities and must provide a broad range of services to the local population and specialized services to an entire state or a region.
- The unique capabilities and interests of the medical school faculty determine the degree of involvement of the medical school in advancing fundamental knowledge in the health sciences and in searching for new and improved modes of prevention, diagnosis and treatment of disease.

The Continuum of Medical Education

Consideration of the cost of undergraduate medical education requires an understanding of its nature and essential elements and its relationship to the total span of education and training of the physician.

The undergraduate medical education process provides the student with:

An understanding of the fundamental principles involved in human development, from its normal sequence to the disorders of development, structure, and function -

To reach this understanding, the student must acquire through classroom, laboratory, seminar, and self-instruction the basic knowledge concerning the physical, chemical, biological, psychological, and social factors which affect human development.

Training in the basic problem-solving process requisite to the diagnosis of disease and disorders in the patient -

To acquire these skills, the student must be trained to obtain information from patients, to select appropriate laboratory tests, to interpret the results and to develop a plan for correcting or ameliorating the disease process within the framework of modern knowledge and capabilities and the patient's unique needs.

Basic knowledge of technical procedures to treat disease and disorders -

To acquire this knowledge, the student must be directly involved with patients through participation under supervision in the solution of actual problems of health and illness as they occur in individuals and a population group, and be provided the opportunity to engage in the practice of clinical acts and procedures until they can be performed with an acceptable degree of accuracy and predictability but with full awareness of the limitations and unknowns involved.

An awareness of the techniques and resources for the prevention of disease and disorders -

The student must be provided with knowledge concerning the means available to the individual and to the community for the prevention of disease and for the maintenance of health.

The attitudes and motivations that will enable him to keep abreast of the developments in medicine after he has earned the M.D. degree -

To develop those characteristics that will lead to a continuous, critical self-instruction throughout his professional life, the student, in the period of his formal education, must have an opportunity to be associated with faculty who, through their own activities in keeping abreast of medical advances, provide the model for the student to emulate.

The exponential rate at which medical knowledge has grown in the recent past, and the likelihood that it will continue to expand at an exponential rate in the future make it imperative that the student be exposed to the scientific method and to the rigors and techniques of the biomedical research process. The student will

then be able to evaluate for himself the results of scientific investigations, and he will have the ability to discern their usefulness in application.

In summary, undergraduate medical education is composed of interacting elements integral to a unified process leading to the M.D. degree. The elements in this process are the instructional activities covering the imparting of disciplinary and inter-disciplinary subject matter through lectures, seminars, and laboratory exercise; participation in the care and management of patients, and training in research methods for the solution of problems in health.

Fundamental to the process for quality medical education is the requirement that the student be instructed by educators who are capable of teaching up-to-date medicine. This can be accomplished only by a faculty that is involved, in adequate measure, with developments at the frontiers of scientific knowledge in the health sciences through such scholarly pursuits as their own biomedical research activities, and in the application of that knowledge through their involvement with contemporary health care practices.

Undergraduate medical education is but the beginning of a continuous process because further formal training in particular areas of medicine is necessary to prepare an individual for medical practice. A substantial period of graduate medical education has become established as an integral part of the total education and training of a physician, whether it be for a career in family practice or the most complex medical or surgical specialty. The continuum of medical education and training from admission to medical school to the beginning of independent practice has become more than a mere theoretical concept. Furthermore, the growth of biomedical knowledge and medical science has convinced the faculties that it is no longer possible to produce a physician broadly competent in medicine. As a result there are increasing opportunities for the undergraduate medical student to undertake an educational program more tailored to his or her ultimate goal in medicine. This in turn has blurred the traditional sharp boundaries between undergraduate and graduate medical education. This of course has important implications for any attempt to segregate and isolate the costs of undergraduate medical education.

Even after the physician finishes his formal period of education and training he must continue learning during his entire career to maintain his competence and keep abreast of the advances in knowledge, technology and medical practice. Thus any meaningful concept of medical education must encompass the full spectrum of undergraduate, graduate and continuing medical education. The medical school plays a critical role in all of these.

Other Educational & Training Programs

To a considerable degree, the training of students in health professions other than medicine also takes place in the medical school. This arrangement not only provides for the best use of faculty and facility resources where the same body of medical science and technology is appropriate for the education of other health professionals, but it also emphasizes for all students the complex inter-relationship of the many specialities and skills essential for modern medical care. In addition, because of the unique capabilities of their faculty, medical schools have increasingly assumed the responsibility for the education of masters and doctoral degree candidates in some of the basic sciences. The presence of these students has broadened the educational experience for the centers' entire student population, enriching the mix of viewpoints and objectives. At the same time, the presence of these students has increased the responsibility of the medical school faculty and medical center administration in providing the resources essential for their training.

Health Services

Because of the sophisticated array of skills and services available in the medical schools, these institutions also serve as an essential referral or tertiary care resource in the structure of community medical services. In addition, these institutions have assumed a substantial role relating to community health care which goes beyond the relationship to specific patients. This clinical activity interacts with and is essential to the educational and training programs and the research activities of the medical school. The faculties of the medical schools thus provide an important segment of the health care in the nation. This health care involves the undergraduate medical students and residents who are at the same time being educated and trained.

Biomedical Research

In addition to the education and patient care activities, medical schools participate in and contribute to broad national research programs directed to the advancement of the biomedical sciences or to the solution of specific health problems. Most of the nation's significant biomedical research is carried out in its medical schools. As Dael Wolfle has pointed out in "The Home of Science", this close interrelationship of research and education has strengthened both and made American science preeminent in the world.

In summary, the foregoing review of the character of present-day medical education, its institutional setting, and the practice of medicine is intended to emphasize:

- The basic continuum comprising the process of medical education in which the undergraduate program leading to the M.D. degree is an increasingly less discrete segment of the entire educational span.
- The integrated nature of the educational process for the principal health professions and related occupations, and the complex institutional framework essential for that process.
- The crucial role of the clinical teaching resources in education, in health care and community service, no single element of which constitutes the reason for the whole.
- The essentiality of a basic body of research to medical education to engender scientific attitudes in students, to assure and maintain faculty competence, and to advance knowledge.

These attributes have generated a distinct institutional form, the academic medical center, which embraces in a comprehensive and unified way the full scope of these complex processes. The attainment of all the social purposes and national objectives in respect to the education of health personnel, in advancing medical science and technology, and in providing for community health needs are critically dependent upon the productivity, the viability, and the integrity of these institutions as functioning entities.

MEASUREMENT OF COSTS – PROBLEMS AND ISSUES

In addition to the difficulties associated with the fact that undergraduate medical education is but one segment of the varied and interrelated responsibilities of the academic medical center, cost determination efforts are confronted with problems of data limitation and conceptual and theoretical issues of cost distribution.

DATA LIMITATIONS

The Association of American Medical Colleges has been involved in sponsoring and conducting cost studies of medical education since 1958. Most recent efforts have centered around the development and improvement of cost allocation methodology and its application to additional academic medical centers, initiated in 1967 with HEW sponsorship. The initial purpose of these studies was to provide the institution with information to enhance its own understanding of the distribution of costs within the institution. Uniform guidelines and costing principles were provided, but their application varied, reflecting the widely differing administrative and program arrangements among the centers. Since only institution needs were contemplated, little attention was directed to the use of the data for cost comparisons among institutions.

The Committee made an intensive effort to make use of the cost allocation studies completed in recent years by a selected group of twelve medical schools. With the cooperation of the staff of these institutions, additional data were developed where necessary to supplement and improve the coverage of the completed cost allocation studies. The objective of the Committee's effort was to assure that all aspects of the undergraduate medical education program and the cost of the required resources were accounted for as completely as possible. It was intended that data for the programs at each of the medical schools be comparable and reflect valid differences in the educational curricula, educational techniques, and educational objectives of the institutions involved. An essential element of this accounting was the measurement or imputation of resource costs not appearing in the medical school budget. The Committee believes that this intensive effort has provided a reliable data base for the measurement of the costs of the undergraduate medical education program at the twelve schools.

The set of data obtained as a result of this cooperative effort underlie the derivation of the costs of the resources for each of the essential components – instruction, research, clinical and other administrative, scholarly, and professional activities – required for the education program leading to the M.D. degree at each of the twelve selected centers.

A variety of approaches to the undergraduate medical educational program characterized the twelve medical schools selected for this study. Six of the schools are private institutions, six are publically owned; all are part of a university or university system. For the year in which the school conducted its cost allocation study undergraduate medical student enrollment was in the 300-399 range for five schools, in the 400-499 range for five schools, and two schools had more than 500 medical students (Table 1).

Table 1
Number of Medical Students and Full-time Faculty
Twelve Medical Schools

School	Number of students	Number of full-time faculty
A	338	346
B	364	525
C	487	204
D	891	301
E	473	215
F	484	174
G	392	616
H	838	529
I	368	278
J	403	192
K	300	167
L	427	422

Some evidence of the differing characteristics of the twelve schools is shown in Table 2 by their rankings in the quartile distributions, compiled regularly by the Association for all fully operational medical schools.

Table 2
Quartile Rankings of the Twelve Medical Schools (1970 - 1971)

School	Number of medical students	Number of full-time students [1]	Number of full-time faculty	Sponsored research expenditures
A	3	2	1	1
B	3	1	1	1
C	2	3	3	3
D	1	1	2	2
E	1	2	3	2
F	2	3	3	3
G	3	1	1	1
H	1	1	1	1
I	3	2	2	2
J	3	4	3	4
K	4	4	4	3
L	2	2	1	2

[1] Includes medical students, interns, residents, pre- and post doctoral students in the basic and clinical sciences and full-time equivalent students in other health professions.

CONCEPTUAL ISSUES SURROUNDING JOINT COSTS

For all elements of undergraduate medical education the activities essential for that program serve other objectives as well. The classroom lecture in a basic science for instance may be directed to medical students and to other health professions students; instruction by the clinical faculty may be to groups composed of house staff and medical students; the research and clinical activities deemed essential to maintain the competence of the faculty to teach modern medicine serves other objectives at the same time, namely, the advancement of knowledge and the provision of clinical care; the administrative and other activities of the faculty are essential for the maintenance of the undergraduate medical education program and the other activities of the medical school.

We are thus confronted with the problems of distributing the costs of functions and activities that serve more than one end-purpose, and for which there is no fundamental basis for allocation of such costs to the individual purposes served. [1/] The costs of joint activities can be distributed to the end-purpose programs in a variety of ways, but the results depend on the method chosen for distribution.

For the instruction component, the allocation to undergraduate medical education of costs for those instructional activities that serve more than one objective utilized primarily a proportionate distribution based on a head count of the different categories of students taught.

The allocation to undergraduate medical education of the appropriate costs for the research, clinical, and other activities of the faculty has been derived for each of the twelve medical schools so as to reflect the actual effort distribution of the faculty in accomplishing the objectives of the school's educational program.

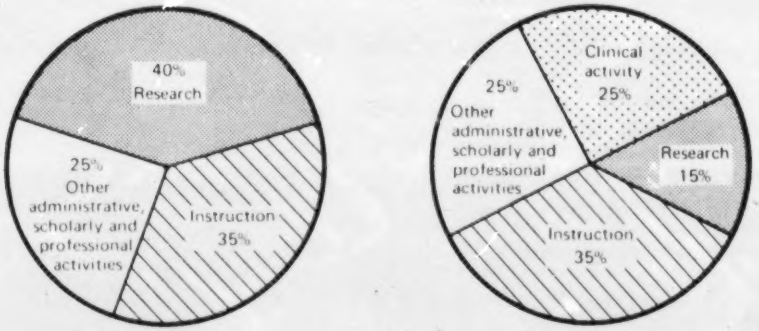
A consensus of the views of medical educators and the available empirical data are the basis for the assumption, accepted by the Committee, that for a faculty member who is fully involved in the schools educational program all the costs of research, clinical, and other activities for that faculty member are also allocable to the costs of the educational program; conversely, for the faculty member who is only fractionally involved in the educational program, only a fraction of these costs is properly allocable to the education program.

The Committee considers that, to be fully involved in the medical school's educational program, the faculty member should devote 35 percent of his effort to the instruction of students (undergraduate medical students, house officers, graduate students in the basic or clinical sciences, and other health professions students). In order to maintain his competence as an educator, fully involved basic science faculty will have

[1/] A discussion of joint costs in medical education is given in Koehler, J. E. and Slighton, R. L., "Activity Analysis and Cost Analysis in Medical Schools", J. Med. Ed., 48 (1973) 531-550.

to be engaged in research activities for 40 percent of their effort, and other administrative and professional activities essential to carry forward the school's educational program will require the remaining 25 percent. The fully involved clinical faculty member requires, in addition to the 35 percent of effort in instruction of students, one-fourth of his effort to be spent in activities whose objective is the delivery of medical services, and 15 percent of his effort in research, in order to maintain his competence and skills as an educator; the remaining 25 percent is required for the administrative and professional duties necessary for the educational program. (This concept of a faculty member fully involved in education is depicted in chart 1).

Chart 1
Concept of a Faculty Member Fully Involved in Education



For the hypothetical faculty member fully involved in education, the amount of research and clinical activity is the minimum needed to maintain his skills; and his other activities are all essential to the programs of the medical school. For this faculty member, therefore, the costs of instruction, research, clinical and other activities are properly considered costs of the educational program.

Thus, for the faculty member who devotes 35 percent of his effort to the instruction of undergraduate medical students, the full costs of the other components of the educational process would also be allocated to the undergraduate medical education program. For the faculty member who spends 10 percent of his time in instruction of undergraduate medical students 10/35 or 2/7 of the costs of the other components are allocable to the undergraduate program.

On a school-wide basis, therefore, the costs of the components of the undergraduate medical education program other than instruction depend upon the ratio of the average percent of faculty effort in instructing medical students to 35 percent.

The technical notes describes the derivation of the empirical data and the estimates of the cost for each component of the undergraduate medical education program.

THE STUDY FINDINGS

In 1972 dollars, the estimated annual costs of the undergraduate medical education program at the twelve medical schools range from $16 thousand to $26 thousand per medical student. (Table 3)

Table 3
Annual Cost per Student - Undergraduate Medical Education
Twelve Medical Schools
(In Thousands of 1972 Dollars)

		Components			
School	Total cost	Instruction	Research	Clinical activity	Other administrative scholarly and professional activities
A	$24.1	$ 9.7	$ 9.5	$2.9	$2.0
B	26.4	9.6	10.0	3.8	3.0
C	16.3	5.7	7.3	1.6	1.7
D	16.7	9.9	2.7	2.8	1.3
E	16.5	7.1	4.3	3.1	2.0
F	16.9	7.2	6.4	1.7	1.6
G	19.9	9.7	5.4	2.3	2.5
H	22.3	9.6	7.1	3.1	2.5
I	21.0	9.3	5.1	4.7	1.9
J	23.8	10.2	6.4	4.6	2.6
K	24.1	8.9	9.5	2.7	3.0
L	16.4	6.4	3.7	3.5	2.8

The varying costs presented should be viewed as guideline measures of the resources required for the M. D. program, reflecting varied institutional settings and educational approaches. The quantitative results for any one center, therefore, cannot be considered as typical or average, nor can they be considered the desired level for all. It is the Committee's belief that the schools selected for the study present a spectrum of the different educational programs, but it is not suggested that the costs at a particular institution of the remaining one-hundred medical schools will necessarily fall within this range of estimates. Furthermore, the means are not presently available by which to relate a practicing physician's effectiveness in health care to the training received as a medical student; the varied cost estimates are not to be considered as indicative of differences in quality in undergraduate medical education programs.

COST OF INSTRUCTION COMPONENT

The Committee requested its Task Force on the Cost of Medical Education to focus upon the instruction component of the undergraduate medical education program using the data developed through the intensive review of the cost allocation studies completed by the twelve medical schools.

The objective of the Task Force was to derive for each of the schools an aggregate cost for the instruction component at each institution so that differences in the aggregate figures among the institutions would be due to differences in educational objectives and the use and cost of the resources necessary to carry out the institution's program of instruction. These costs estimates are presented in Table 4.

Table 4
Annual Cost per Student of Instruction Component of Undergraduate Medical Education at Twelve Medical Schools
(In Thousands of 1972 Dollars)

School	Total instructional cost	Instructional staff	Supporting staff	Other costs
A	$ 9.7	$4.0	$1.8	$3.9
B	9.6	5.4	1.1	3.2
C	5.7	2.9	.6	2.1
D	9.9	4.6	3.0	2.3
E	7.1	3.9	.9	2.3
F	7.2	2.9	1.0	3.3
G	9.7	4.3	2.6	2.9
H	9.6	4.1	3.2	2.3
I	9.3	3.8	2.8	2.8
J	10.2	4.2	1.2	4.7
K	8.9	4.7	.7	3.5
L	6.4	3.4	1.4	1.6

The schools, of course, differ in their organizational structure and have differing curricula, so that distribution of the total instructional cost by organizational units is not uniform for all institutions. The extent to which medical school resources are utilized, for instance, as compared with the use of teaching hospital resources differs considerably among the institutions studied. It is due in part to the varying organizational and financial arrangements between the institutions and their clinical teaching facilities. For this reason, comparisons of the instructional costs are appropriate only at the aggregate center level, although to assure comprehensive coverage the total cost for each center had to be built up by considering each of the organizational and object of expense components that are involved in the instruction pro-

gram. The data in Table 4 show the cost of the instructional and supporting staff, and the other costs appropriate to the instructional component of the school's educational program. This has been defined as classroom lectures, seminars, laboratory exercises, and the exposure of the student to clinical practices and procedures through direct involvement with patients.

Instructional staff costs cover the input to the instruction of medical students on the part of medical school faculty, hospital based clinicians and house staff, and imputations of salary costs that would otherwise have to be paid were volunteer faculty services not available.

The costs of the supporting staff reflect the allocation of the proportionate share of the salaries of nurses, laboratory technicians, clerical, and administrative staff, to the extent to which these employees of the medical center are involved in instruction.

Other costs include faculty and employee fringe benefits and all nonsalary expenses associated with medical student instruction, of academic departments, laboratories, vivarium, library, and business services. It also includes estimates of equipment purchases (or allowances for equipment depreciation) allowances for depreciation of physical facilities, and costs of plant operation that can be properly chargeable to the instruction of the medical student.

COST OF RESEARCH COMPONENT

The costs per medical student for the research component of the undergraduate medical education program for the twelve medical schools were derived by the Committee following suggestions provided by the Association's Committee on Biomedical Research and Research Training.

The research committee viewed the total research program of the center as being composed of the following: First, a level of research activity sufficient to provide for the requirements of the educational program; second, a level of research initiated by the investigators at medical schools to advance fundamental knowledge in the health sciences; and third, a level of research conducted at the medical school in response to nationally targeted objectives in specific health areas.

The earlier discussions of the elements and objectives of undergraduate medical education set forth the rationale for the consensus that if the medical student is to be educated to practice up-to-date medicine, he must be instructed by a scientifically competent faculty, and that this can be accomplished only where the faculty is engaged in at least a minimum level of scholarly activities, including biomedical research.

It is evident that there is a dual objective served by even the first level of research engaged in by the faculty – the research provides a required element of the undergraduate medical education program and at the

same time it increases the fund of biomedical knowledge. Nevertheless, the Committee decided to include the entire cost of the first level of research as an educational cost, and to allocate a portion of that cost to the undergraduate M. D. program.

Once these decisions were made, the Committee was able to find an empirical basis for distributing research costs to the undergraduate program, but judgment was still necessary to determine what that first level may be. The Committee approached this by considering an idealized or model faculty member fully involved in education, as discussed in the section on joint costs. The basic idea is that the required amount of research and other scholarly activities for the faculty member fully involved in education is at the minimum (first) level described above, and therefore all costs of his research are a proper cost of medical education. Actual faculty behavior in instruction is measured against the model, and only a fraction of the minimum level research costs are allocated for those not fully involved in education.

The actual research costs as shown in the cost allocation studies for each of the schools were taken into account in establishing the costs of the research activity of the model faculty member for each school. The result of these calculations for the twelve medical schools is shown in Table 5.

Table 5
Annual Cost per Student of Research and Other Activity Components of Undergraduate Medical Education at Twelve Medical Schools
(In Thousands of 1972 Dollars)

	Cost of Research			Cost of other Administrative, Scholarly and Professional activities		
School	Total research cost	Basic science faculty	Clinical faculty	Total other costs	Basic science faculty	Clinical faculty
A	$ 9.5	$6.4	$3.1	$2.0	$ .7	$1.3
B	10.0	5.1	4.9	3.0	.7	2.3
C	7.3	3.9	3.4	1.7	.3	1.4
D	2.7	1.1	1.6	1.3	.2	1.1
E	4.3	2.1	2.2	2.0	.4	1.6
F	6.4	4.2	2.2	1.6	.5	1.1
G	5.4	3.0	2.4	2.5	.7	1.8
H	7.1	2.9	4.2	2.5	.3	2.2
I	5.1	2.5	2.6	1.9	.4	1.5
J	6.4	4.5	1.9	2.6	.9	1.7
K	9.5	4.9	4.6	3.0	.6	2.4
L	3.7	1.5	2.2	2.8	.4	2.4

The Committee will continue to consider alternative solutions for determining the level of research essential for the educational program. Additional medical centers will be included in these further investigations, and the opinions of medical school administrators, educators, researchers, and students will be surveyed. These further studies will either confirm the judgmental decision underlying the estimates arrived at for the twelve medical schools or will provide the data to modify them.

COST OF CLINICAL ACTIVITY COMPONENT

The cost per medical student, shown in Table 3, for this component of the undergraduate medical education program reflects the requirement that the clinical faculty must be engaged in a certain level of professional services to patients in order to maintain competence and skills as educators.

No hospital patient care costs are involved in the derivation of these estimates. These costs are excluded, because the care of the sick was considered by the Committee to be the essential purpose, which must take place irrespective of the concurrent educational program.

As in the case of research activities, the costs of clinical activity to maintain the competence and the skill of the faculty was allocated to the education program by reference to a model faculty member fully involved in education. The entire costs of the clinical activity of the fully-involved faculty member is judged an educational cost, and only a fraction of the cost of the same amount of clinical activity is allocated to education for those faculty involved in education to a lesser degree. The application of these assumptions for the derivation of the estimates is described in the technical notes.

The Committee will continue to investigate this aspect of the educational program, as it expects to do for the research component.

COST OF ADMINISTRATIVE, SCHOLARLY, AND PROFESSIONAL ACTIVITIES COMPONENT

Because medical school faculty are involved in additional activities necessary to the fulfillment of the objectives of the medical schools' programs, a proportion of the costs of these activities is properly allocable to the undergraduate medical education program. These other activities include the participation of the faculty in the school's administration and committee structures, their acting in an advisory capacity to community, state, and federal agencies, as well as their scholarly activities not related to specific research endeavors but which are necessary to keep them abreast of the broader developments in medical science and education.

As in the derivation of the costs for the research and clinical activity components, the full costs of these other activities is allocable to undergraduate medical education for the faculty fully-involved in instructing medical students, and only a fraction of the costs is allocable for the faculty involved to a lesser degree in instructing medical students.

SIGNIFICANCE OF THE COST MEASURES

The derivation of estimates of the cost of undergraduate medical education is but the necessary prelude to the fulfillment of the Committee's principal objective - the development of recommendations for the most appropriate and equitable financing of medical education, which would also assure the continued viability and fiscal stability of the educational institution as an entity, capable of performing all of its inter-related functions to the degree and in the fashion society's needs dictate.

The cost measures for the twelve schools studied are made available now, prior to the completion of the Committee's full study, since they may be helpful to other medical schools as bench marks against which to compare their own cost measures. The report also provides the methodology underlying the derivation of the published estimates, which may also serve as a protocol for cost studies by other educational institutions.

The estimates for the twelve schools show a narrower range than might otherwise have been anticipated, in view of the spectrum of educational approaches represented by the schools in the study. The annual costs of the M.D. program range from $16 thousand to $26 thousand per student, the highest cost being about 60 percent greater than the lowest cost. For the twelve centers, the resources required for the instruction component represent approximately two-fifths of the total costs for the undergraduate medical education program. A similar measure of the spread in costs for the instruction component is about 70 percent, but for the research and clinical activity components, the cost for the school at the upper range in each of these components is more than twice that of the school at the lower range. This suggests that the kinds of research being performed differ considerably among the institutions in terms of the costs involved, and that the costs of the clinical activity of the faculty also vary more widely than the elements that go into the instruction component.

The range of estimates for the cost of undergraduate medical education reflects the variety of approaches to the content and structure of the educational curriculum and the variety of educational objectives of the institutions studied by the Committee for the purposes of this report. This diversity has been brought about by the differing historical backgrounds and community settings of the institutions; differing faculty and student perceptions, values, and interests; and the differing goals of the institution's leadership. It may be that differences in the quality of the medical care provided by the practicing physician may also be a reflection of his educational training, but data are not now available to establish this. Since institutional characteristics vary so

widely, no measure of the cost of undergraduate medical education in a single school or small groups of schools can be representative of the cost in the United States, of providing the education leading to the M.D. degree. Moreover, differences among institutions are essential, if the flexibility in educational approach required for a vigorous and innovative educational system is to be retained.

The review of the educational process and the institutional setting requisite for the education of persons for the practice of medicine has emphasized the entire spectrum of medical education, with the program leading to the professional degree being only the initial phase. Moreover, distinctions between undergraduate and graduate medical education have now become less sharp and less meaningful; the relationship of the education of other health professionals has become more intimate and interdependent; and the institution's research and clinical activities constitute essential and inseparable components of the educational process. The productive entity essential to all the major educational programs in the health field and to much of the national objective in medical research and health care is the academic medical center. It provides their common structure and is concerned with the relationship of each to each other and to the larger social needs and problems being served. Cost data for an individual education program in isolation necessarily ignores the integrity and coherence of this essential institutional framework. Cost data for individual programs do not cover the resources needed to cultivate the development of new and different programs or new approaches to old ones, and to assure the institutions future viability and relevance. It is these needs that must be provided for if the nation is to have vigorous and capable institutions serving society's objectives in health that depend upon academic resources and capabilities.

These are the considerations which the Committee plans to investigate in subsequent phases of its study of the financing of medical education.

TECHNICAL NOTES

A. Derivation of the Empirical Data

The Committee's Task Force on the Cost of Medical Education developed the methodology for deriving the empirical data underlying the estimates of the undergraduate medical education program at the twelve medical schools. The data were obtained principally from the cost allocation studies completed by the schools and additional information provided by the institutions.

Cost allocation studies present the most comprehensive set of fiscal data available on the educational programs of the medical schools. These studies, however, were conducted primarily to serve the institution's own needs. Although uniform guidelines were provided, there were variations in their application because of differing administrative and program arrangements. The Task Force, therefore, requested a sub-committee[1/] to conduct intensive reviews of these studies, in conjunction with the staffs of the individual schools.

The purpose of these intensive reviews was to correct for any vagaries of accounting or reporting procedures in order to derive valid measures of the resources required for the school's educational program. Differences in the levels of the required resources would than reflect program differences in content, form, and manner of presentation.

The schools were selected for the purpose of this study from those institutions with experience and expertise with the cost allocation principles and guidelines established by the Association of American Medical Colleges; the schools are also representative of the diversity in approaches to the educational program leading to the doctor of medicine degree.

The selected schools have the following characteristics:

(1) six are private, six are public institutions; (2) all are part of a university or university system; (3) two of the centers had undertaken their cost studies for the 1968-69 fiscal year, three for 1969-70, four for 1970-71, and three for 1971-72 (All costs were adjusted to 1972 dollars); (4) five had undergraduate M.D. enrollments (during their cost study year) in the 300-399 range, five 400-499, and two in excess of 500; (5) research program costs were below $5 million at three of the institutions, $5-10 million at five, and $11-14 million at four.

[1/] The sub-committee members were Dr. Edgar Lee of Case Western Reserve University School of Medicine, Dr. John Bartlett of the University of Texas Medical School at Houston, and Mr. William Hilles and Mr. Thomas Campbell of the AAMC staff.

The schools were grouped in pairs to facilitate the intensive studies by the sub-committee, and to provide the means for the medical school's staff to discuss differences in programs with their colleagues at the paired institution. The schools were paired on the basis of their having, approximately, similar characteristics of student enrollment, faculty size, research and operating expenditures, and organizational structure.

INSTRUCTIONAL STAFF COSTS

Strict full-time faculty, part-time faculty, and professional staff costs were derived by distributing the salaries paid by the institution on the basis of individually completed activity reports. Among the schools in the study, the activity report varied in structure; in some instances it took the form of a percentage of effort, in other schools, activities were reported in hours. These measures of effort spent in instruction were applied to the salaries paid by the school. For the house staff, a variety of procedures were followed in deriving the costs of their effort in instructing medical students; for some schools the interns and residents were requested to complete activity reports, in other schools, the allocation of their effort was determined by the department chairman. The percentage of effort spent in instructing medical students was applied to the stipends paid, and to the costs of such fringe benefits as allowances for meals, laundry, etc.

Geographic full-time faculty base salaries paid by the medical school are generally lower than the strict-full time salaries, because the geographic full-time faculty member is permitted to receive fees paid for his professional services to patients. An adjustment had to be made for the medical schools' costs for the geographic full-time faculty since if the costs for instruction of a school with strict-full time clinical faculty were compared with the costs to a school with geographic full-time clinical faculty, the costs would be understated for the latter school. The following procedure was used to impute a cost to the instruction program to avoid understating the costs of the geographic full-time faculty:

(1) median GFT base (institution-provided) salaries were computed by rank and department;
(2) these medians were compared with corresponding median salaries by rank and department for strict full-time faculty on a national basis;
(3) the difference between the two medians was multiplied by the number of faculty by rank and by clinical department;
(4) the result was multiplied by the aggregated faculty effort assigned to M.D. instruction for the clinical departments.

Volunteer faculty make significant contributions to the instruction of medical students at some of the schools in this study. These volunteers are either totally uncompensated or are given a token payment. In the latter case, the token payment was included as an actual medical school expense. An adjustment had to be made to the instruction cost for a school where volunteers are used, to provide data that would be comparable with the instruction costs at schools with no volunteer faculty. The following procedure was used to impute a cost to the instruction program for the services of the volunteer faculty:

(1) personnel at the medical school (generally the clinical department chairman) evaluated the contribution of volunteer faculty assigned to their respective departments in terms of the number of full-time faculty that would have to be hired if the services of the volunteer faculty were not available;

(2) salary costs were computed based on appropriate salary scales for the faculty that would have to be hired to replace the volunteer faculty;

(3) these salaries were prorated to M.D. instruction based on the evaluation of the clinical department chairmen of the average effort in undergraduate medical education.

It should be emphasized that the above procedure was followed only where it was determined that the volunteer faculty would have to be replaced by paid faculty, if the services of the volunteer faculty were no longer available.

SUPPORTING STAFF COSTS

Salaries of the staff supporting the instructional program were allocated to M.D. instruction, estimated on an effort distribution basis. This was derived by supervisors, or department chairmen, where appropriate. The employees covered in this category included nurses, laboratory technicians, librarians, clerical, and administrative staff.

OTHER COSTS

Included in this category are the faculty and other employee fringe benefits, prorated to undergraduate M.D. instruction on the basis of the distribution of the salary costs allocated to M.D. instruction. Fringe benefits were also imputed on the imputed costs for volunteer and geographic full-time faculty.

Costs for operation and maintenance of plant were allocated to M.D. instruction on the basis of functional space use. The same basis was used to impute a cost for depreciation of physical facilities.

Equipment purchases may have been charged to the cost of the instruction program, if this was in accordance with the school's accounting policy; alternatively a use or depreciation charge was included in the instruction cost.

Library, vivarium, and other expenses were allocated to M.D. instruction on the basis of the number of medical students as a proportion of the total number of students.

ADJUSTMENT OF COSTS TO 1972 BASE

Because the costs identified with some of the centers in this study were incurred as early as 1968-69, all costs had to be adjusted to a common year (1972).

Instructional staff costs of medical schools and expenses of the academic departments were adjusted by an index of the median salary for a strict full-time faculty associate professor, 1972 = 100. House staff stipends were adjusted by an index of the national average of house staff stipends, 1972 = 100. All other expenses were adjusted by the Gross National Product implicit price deflator, 1972 = 100.

TECHNICAL NOTES

B. Research, Clinical and Other Administrative, Scholarly and Professional Activity Components of the Cost of Undergraduate Medical Education

Fundamental to the process for quality medical education is the requirement that the student be instructed by educators who are capable of teaching up-to-date medicine. This can be accomplished only by a faculty that is involved, in adequate measure, with developments at the frontiers of scientific knowledge in the health sciences through such scholarly pursuits as their own biomedical research activities and in the application of that knowledge through their involvement with contemporary health care practices.

The allocation to undergraduate medical education of the appropriate costs for the research, clinical, and other activities of the faculty has been derived for each of the twelve medical schools so as to reflect the actual effort distribution of the faculty in accomplishing the objectives of the school's educational program.

A consensus of the views of medical educators and the available empirical data are the basis for the assumption, accepted by the committee, that for a faculty member who is fully involved in a school's educational program, all the costs of the faculty member's research, clinical, and other activities are also allocable to the educational program; conversely, for the faculty member who is only fractionally involved in the educational program, only a fraction of these costs is properly allocable to the education program.

A model was constructed for the purpose of determining the proper cost per undergraduate M.D. student for the research, clinical, and other administrative, scholarly, and professional activities of the faculty which may be considered necessary for the support of an effective educational program. In determining the costs, the model takes into account the "degree of involvement" of the faculty member in instruction of the undergraduate M.D. students as well as the cost of conducting research or clinical activity at the institutions.

In the following discussion of the model, a subscript of 'c' will denote clinical faculty and a subscript of 'b' will denote basic science faculty. The application of the model to determine the cost per student for the clinical activity of the faculty is described first.

The model clinical science faculty member "fully involved in education" is defined as one who spends a fraction I_c of his time in instruction, including M_c for undergraduate medical education and G_c for graduate medical education and other instructional responsibilities of

the medical school faculty ($M_C + G_C = I_C$). Such a person should spend a fraction P_C of his time in clinical activities in order to maintain his skills as an educator.

All the cost of the clinical activity necessary to maintain the skills of this model faculty member who is "fully involved in education" is allocable to the cost of the education programs. A fraction of the cost equal to the ratio of the undergraduate instruction to total instruction

$$\left(\frac{M_C}{M_C + G_C}\right)$$

is allocable to the undergraduate medical education program.

This cost of clinical activity on a per student basis is computed as follows:

If C_C is the cost of maintaining a full-time clinician at a given school, then $P_C \cdot C_C$ is the cost of clinical activity for the model faculty member who is "fully involved in education." All of this cost is allocable to the educational programs. The portion of this cost allocable to the undergraduate medical education program would be

$$\left(\frac{M_C}{M_C + G_C}\right) \cdot P_C \cdot C_C$$

This model clinical faculty member is a construct required for the calculation, but very few real faculty members are fully involved in instruction in this sense. Most are engaged in clinical activity to a much greated extent than that of the model, and most faculty members have a correspondingly smaller fraction of their effort devoted to undergraduate medical instruction.

If the actual faculty member is engaged to a lesser degree in undergraduate medical instruction than the model faculty member, a smaller portion of the cost of those activities which maintain his professional competence should be allocated to undergraduate medical education. If his undergraduate medical education involvement is half the model amount, only half as much cost should be allocated, if his involvement is one-third that of the model, one-third of the model cost should be assigned; and if he has no involvement with undergraduate medical education, no cost should be assigned.

If $\overline{M_C}$ is the average fraction of effort devoted to undergraduate medical education at a particular school, then, with this approach, the clinical activity cost to be assigned to the undergraduate medical education program for the average clinical faculty member is

$$\left(\frac{\overline{M_C}}{M_C}\right) \cdot \left(\frac{M_C}{M_C + G_C}\right) \cdot P_C \cdot C_C.$$

The above reduces to

$$\left(\frac{\overline{M}_C}{M_C + G_C}\right) \cdot P_C \cdot C_C,$$

which can be expressed as

$$\left(\frac{\overline{M}_C}{I_C}\right) \cdot P_C \cdot C_C,$$

since $M_C + G_C = I_C$, which is the model percentage of effort to instruction for a "fully involved" faculty member.

Multiplying by the number of clinical faculty and dividing by the number of undergraduate medical students will put such clinical activity costs on a per student basis.

$$\text{Clinical activity costs per student} = N_C \cdot \left(\frac{\overline{M}_C}{I_C}\right) \cdot P_C \cdot C_C/N_S,$$

where N_C is the number of full-time clinical faculty and N_S is the number of undergraduate medical students.

Data are available for all the parameters of the above equation except for the model percent of effort in instruction for a clinical faculty member fully involved in education (I_C) and the model percentage of effort to clinical activity for maintenance of competence of this fully involved clinical faculty member (P_C).

An empirical methodology was used in conjunction with the judgment of medical educators to arrive at the percentages of effort for the model faculty members. The methodology used was as follows: faculty effort reports from one of the twelve centers were analyzed. The upper quartile in effort to instruction was used in order to develop the model faculty members. This group of faculty were considered to be "fully involved in education" and the manner in which they allocated their time was used as the standard for the model "fully involved educator." This effort breakdown was then reviewed by a panel of medical educators to arrive at the allocation of effort of the "fully involved faculty members" shown as follows:

Allocation of Effort of "Fully Involved Faculty Members" (in percent)

	Basic Science faculty	Clinical faculty
All Instruction	35	35
Research	40	15
Other administrative, scholarly and professional activities related to medical education	25	25
Clinical activity	–	25

A similar methodology can be used to develop the costs for the research activity of the faculty allocable to the undergraduate M.D. program and the costs of other administrative, scholarly and professional activities related to medical education allocable to the undergraduate M.D. program.

The model clinical science faculty member "fully involved in education" is defined as one who spends a fraction I_c (35 percent) of his time in instruction. Such a person should spend a fraction P_c (25 percent) of his time in clinical activities as well as a fraction R_c (15 percent) of his time in research and a fraction D_c (25 percent) of his time in other activities in order to maintain his skills as a competent educator and to carry forward the programs of the medical school. Going through derivations similar to those used to determine the cost per student of clinical activity, equations were derived for the cost per student of research and other administrative, scholarly and professional activities related to medical education for clinical science faculty:

Research cost per student for clinical faculty =

$$N_c \cdot \left(\frac{\overline{M}_c}{I_c}\right) \cdot R_c \cdot C_r/N_s$$

and

Other activity cost per student for clinical faculty =

$$N_c \cdot \left(\frac{\overline{M}_c}{I_c}\right) \cdot D_c \cdot C_{dc}/N_s,$$

where: N_c, N_s, $\overline{M}_c$, & I_c are as previously defined and

- R_c = the model percent of effort in research for maintenance of skills for clinical faculty (15 percent)
- C_r = the cost of maintaining a full-time equivalent researcher at the institution
- D_c = the model percentage of effort in other administrative, scholarly and professional activities related to medical education for maintaining of skills for clinical faculty (25 percent)
- C_{dc} = the cost of maintaining a clinical faculty member spending all his time in other administrative, scholarly and professional activities related to medical education (the amount used was the mean salary of clinicians)

For the basic science faculty, the equations are essentially similar:

Research cost per student for basic science faculty =

$$N_b \cdot \left(\frac{\overline{M}_b}{I_b}\right) \cdot R_b \cdot C_r/N_s$$

and

Other activity cost per student for basic science faculty =

$$N_b \cdot \left(\frac{\overline{M}_b}{I_b}\right) \cdot D_b \cdot C_{db}/N_s,$$

where:

$\frac{N_b}{M_b}$ = number of basic science faculty

$\overline{M}_b$ = mean percentage of effort of the basic science faculty to the undergraduate M.D. program

I_b = the model percentage of effort to instruction for basic science faculty (also 35 percent)

R_b = the model percentage of effort to research for maintenance of skills as a competent basic science instructor (40 percent)

C_r = the cost of maintaining a full-time researcher

D_b = the model percentage of effort to other administrative, scholarly and professional activities related to medical education for maintenance of skills as a competent basic science instructor (25 percent)

C_{db} = the cost of maintaining a basic science faculty member spending all his time in other administrative, scholarly and professional activities related to medical education.

As an example of the applications of the model, consider the clinical activity component cost. It has been determined that the "fully involved (35 percent) in education clinical faculty member" should spend at least 25 percent of his time in clinical activity which is necessary to maintain his skills as a competent educator. The cost of this clinical activity is fully allocable to the educational programs. This cost is simply 25 percent of the cost of maintaining a full-time equivalent (FTE) clinician at each institution.

Let us assume we have a hypothetical school with 100 clinical faculty members who spend, on an average, 10 percent of their time teaching undergraduate M.D. students. In addition, assume that there are 300 undergraduate M.D. students and that the cost of maintaining an FTE clinician is $75,000 per year. Then the component cost of clinical activity attributable to the undergraduate M.D. program on a per student basis is;

$$100 \text{ fac} \cdot \left(\frac{10\%}{35\%}\right) \cdot (25\% \cdot \$75{,}000) \div 300 \text{ students}$$

and equals $1,786 per undergraduate M.D. student.

The methodology for arriving at the component cost of research per student is similar except that now we must use the percentage of time which a "fully involved in education" faculty member should spend

in research in order to maintain his skills as a competent educator. In addition, the cost of maintaining an FTE researcher must be substituted for the cost of maintaining an FTE clinician.

It has been determined that "fully involved in education" basic science faculty members should spend at least 40 percent of their time in research in order to maintain their skills as competent educators. For clinical faculty members the amount has been determined to be 15 percent.

Looking at the same hypothetical school but now adding the facts that there are 50 basic science faculty members who also spend 10 percent of their time, on the average, in instructing undergraduate M.D. students and that the cost of maintaining an FTE researcher is $80,000, we have the following component costs of research:

$$\text{Clinical faculty research} = 100 \text{ faculty} \cdot \left(\frac{10\%}{35\%}\right) \cdot (15\% \cdot \$80{,}000) \div 300 \text{ students},$$

which equals $1,143 and

$$\text{Basic science faculty research} = 50 \text{ faculty} \cdot \left(\frac{10\%}{35\%}\right) \cdot (40\% \cdot \$80{,}000) \div 300 \text{ students},$$

which equals $1,524. The total research cost per student equals $2,667.

The final support activity component is "other administrative, scholarly and professional activities related to medical education." For this component, it has been determined that "fully involved in education" basic science and clinical faculty should spend 25 percent of their time in administrative, scholarly and professional activities related to medical education. The cost of this activity is fully allocable to the instructional programs and is simply 25 percent of the salary of the faculty member.

At the same hypothetical school, assume that the average salary of basic science faculty is $25,000 per year and that the average salary of clinical faculty is $30,000 per year. We have the following costs of administrative, scholarly and professional activities related to medical education:

Clinical faculty:

$$100 \text{ faculty} \cdot \left(\frac{10\%}{35\%}\right) \cdot (25\% \cdot \$30{,}000) \div 300 \text{ students},$$

which equals $714 per undergraduate M.D. student, and

Basic science faculty:

$$50 \text{ faculty} \cdot \left(\frac{10\%}{35\%}\right) \cdot (25\% \cdot \$25{,}000) \div 300 \text{ students},$$

which equals $298 per student. Total "other activity" costs per student equal $1,012.

Thus, the support activity costs per student at this hypothetical school are approximately $1,800 for clinical activity, $2,700 for research and $1,000 for administrative, scholarly and professional activities related to medical education. The cost of these three support activities at this hypothetical school is $5,500 per student per year.

MEMBERSHIP LIST

AAMC Committee on the Financing of Medical Education

Charles C. Sprague, M.D.
Chairman
University of Texas, Dallas

William G. Anlyan, M.D.
Duke University

James W. Bartlett, M.D.
University of Rochester

Howard L. Bost, Ph.D.
University of Kentucky

Samuel T. Castleman
American Security & Trust
(Resigned, Oct. 8, 1971)

Robert A. Chase, M.D.
Stanford University

John A. Gronvall, M.D.
University of Michigan

Donald J. Hanahan, Ph.D.
University of Arizona
(Resigned, Sept. 1, 1972)

William D. Mayer, M.D.
University of Missouri, Columbia

Russel A. Nelson, M.D.
The Johns Hopkins Hospital

Robert G. Petersdorf, M.D.
University of Washington
(Resigned, May 31, 1972)

Bert Seidman*
AFL-CIO

William H. Stewart, M.D.
Louisiana State University

*Mr. Seidman did not participate in the Committee's consideration of this report

Task Force on Cost of Medical Education

John A. Gronvall, M.D.
Chairman
University of Michigan

John C. Bartlett, Ph.D.
University of Texas, Houston

James W. Bartlett, M.D.
University of Rochester

Donald A. Boulton, Ed.D.
University of North Carolina

Ray E. Brown
Northwestern University

John E. Chapman, M.D.
Vanderbilt University

Christopher C. Fordham, III, M.D.
University of North Carolina

Arnold Lazarow, M.D., Ph.D.
University of Minnesota

L. Edgar Lee, Jr., M.D.
Case Western University

William D. Mayer, M.D.
University of Missouri, Columbia

Henry C. Meadow
Harvard Medical School

William B. Weil, Jr., M.D.
Michigan State University

Henry Pohl
Chicago Medical School
(Student Representative)
(resigned, Dec. 31, 1972)

Alvin Strelnick
Yale Medical School
(Student Representative)
(resigned, Dec. 31, 1972)

Task Force on the Cost of Graduate Medical Education and Faculty Practice Plans

William G. Anlyan, M.D.
Chairman
Duke University

Christopher C. Fordham, III, M.D.
University of North Carolina

William J. Grove, M.D.
University of Illinois

Robert M. Heyssel, M.D.
The Johns Hopkins Medical Institutions

Arnold S. Reldman, M.D.
University of Pennsylvania

Charles B. Womer
Yale-New Haven Hospital

Task Force on Facilities

Howard L. Bost, Ph.D.
Chairman
University of Kentucky

Gerlandino Agro
NewYork Medical College

Charles F. Gregory, M.D.
University of Texas

Baldwin F. Lamson, M.D.
UCLA Hospitals & Clinics

Robert G. Lindee
Henry J. Kaiser Family Foundation

Manson Meads, M.D.
Wake Forest University

Task Force on Biomedical Research:

The Executive Council in September, 1972, established the Committee on Biomedical Research and Research Training. The Task Force on Biomedical Research, therefore, ceased to exist as of September 14, 1972.

Robert G. Petersdorf, M.D.
Chairman
University of Washington

Ronald Estabrook, Ph.D.
University of Texas

Alfred Gellhorn, M.D.
University of Pennsylvania

Gerhard H. Giebisch, M.D.
Yale University

Donald J. Hanahan, Ph.D.
Vice-Chairman
University of Arizona

Robert G. Lindee
Stanford University

A. Brian Little, M.D.
Cleveland Metropolitan General Hospital

Paul A. Marks, M.D.
Columbia University